

which so many writers of popular books consider necessary. At the same time, fifteen pages of introduction, consisting entirely of rather obvious generalities with virtually no facts, seems excessive. But, as one reads on, one realizes that this is the style in which the whole book is written. There are short passages in which numerical data are quoted: for instance, on page 18 we learn that over 13 million pounds of meat were obtained from wild animals in the state of Michigan in the hunting season of 1941-2 (though it is not stated what proportion this is of total consumption); but this is an isolated example. There are no tables, such as one might expect, of—say—population growth in the main regions of the world. But perhaps tables were thought too dull for a non-specialist audience: if so, it might be thought that at least, in this television age, there would be some information in the form of graphs or diagrams. In fact, there are no diagrams of any kind. For hard facts the reader must turn to the works cited in the excellent short bibliographies which follow the chapters.

What then can a reader learn from this book? The topics covered include man as a social animal, with a discussion of human behaviour contrasted with that of other species; human genetics; human population dynamics; our natural resources; the evolution and deterioration of human communities; and the ideas and moral codes which help to bind human communities together. The chapters dealing directly with populations and the evolution of human communities seemed to me the most valuable, and in them the reader can find much of interest in the way of ideas and concepts, if little systematic information.

On genetics I could find no clear account of fundamentals, but a number of tautologous or redundant statements such as: "it is certain that no individual can long continue to live in a habitat to which he is seriously unadapted." Professor Dice discusses what selective agencies are acting on modern human populations without any account of the genetical basis of human polymorphism; and, although he seems at

some points quite clear about the overriding importance of *social* evolution for man, he tells us that "we would do well... to conserve our various classes and races" since their absence "would slow down evolutionary progress"! I need hardly add that neither "race" nor "class" is defined.

On behaviour there is talk of the "elements of human behaviour that are inherited as instincts" and of the "fundamental drives" which actuate human behaviour; but there is no hint of the controversies which have raged around these concepts, or of the factual data which have a bearing on the subject.

The general conception of this book was so good that it is most disappointing that it is not possible to recommend it wholeheartedly. The author writes:

Selfishness, ignorance and bigotry may be able to delay the discovery and application of scientific principles to human communities, but no kind of antisocial force will be able, I believe, to prevent the ultimate evolution of a series of orderly world communities which will continually advance toward ever-higher levels of culture. If effective efforts are made to discover and apply the natural laws that affect human affairs, the time required to construct a well organized group of world communities can be greatly shortened. Our future is in our own hands.

This positive attitude to our present difficulties is most welcome. Perhaps we may hope that, in a second edition, Professor Dice will so strengthen the presentation of his thesis that his book will make a real contribution to the application of science to human affairs.

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## POPULATION

**Stycos, J. Mayone.** *Family and Fertility in Puerto Rico*. New York, 1955. Columbia University Press. (London, 1956. Cumberlege.) Pp. xv + 332. Price 48s.

A Social Service Research Centre was set up in Puerto Rico in 1945, and under its auspices a number of projects have already been completed, including investigations into fer-

tility and family life. The island is an interesting example of a developing country in which the impact of Western civilization has had the effect of greatly reducing death rates without so far bringing about much change in fertility. As a result, population pressure is acute and is relieved only by a substantial volume of emigration to the United States of America. It is open to question whether fertility will soon decline, and if it does so, what rate of diminution may be expected. In order to examine the matter further, the object of the present inquiry has been to "explain the dynamics of child spacing in Puerto Rican families of low income and low education." Such an inquiry might be expected to throw some light not only on the problems of the country in question but also on those of other similar areas and, as these are crucial today, perhaps even to be capable of providing a pointer towards the major world demographic developments of the immediate future. It is therefore pertinent to consider what value this book has from an international viewpoint as well as a local one.

To ask so much as a prognostication of world-wide demographic trends from any single investigation is probably to court disappointment. Reference to the method by which the information was collected by the author and his co-workers shows that the study was only exploratory in character, and was based on interviews with no more than seventy-two young married couples with children in one part of the island—a small and not altogether unbiased sample. The interviews were searching, and capable of revealing in detail a selection of typical attitudes and beliefs having an important bearing on reproduction but their results cannot be measured with precision or confidently regarded as being applicable to more than a locality. Nevertheless, they may well provide a framework for future studies and enable the setting up of a series of hypotheses for more widespread testing.

When large families are not particularly desired, and yet the fertility rate remains high, one or more of three causes may be supposed to be in operation: general ignor-

ance of the methods of birth control; lack of the necessary materials; or inability to use the methods effectively. But Puerto Ricans know about contraceptives and can easily obtain them. Why, then, do they not apply birth control effectively? The investigation reveals that some of the reasons are unexpectedly subtle.

First, union outside marriage is relatively common; in these circumstances, little interest in family limitation is likely to be shown by the father, who is not bound to support his children indefinitely, and at the same time the mother may want more children—in order to tie down her partner morally as much as possible. It has been shown in other Caribbean investigations, however, that the breakage of such unions and the formation of new ones does not in itself lead to high fertility, owing to the periods of time that elapse between one "affair" and another.

Secondly, strict supervision of young girls leads to a feeling of rebellion on their part and a desire to escape from home by means of an early union or marriage. This desire is usually fulfilled, and then another aspect of their cloistered upbringing shows itself—namely ignorance of the means of family limitation; this is often not remedied until children have been born. From the man's point of view, the desire to demonstrate virility and to have a son are also factors tending to promote high fertility. Finally, prudishness on the part of both sexes often prevents adequate discussion between them of questions of family building, and lack of communication between husband and wife is perhaps the greatest deterrent to effective birth control practice.

The book concludes with some useful suggestions for improving birth control clinics and revising public health measures in Puerto Rico, and for the conduct of future inquiries of a similar kind. One is left with the impression that the findings of the investigation may well represent conditions in the island quite faithfully, in spite of the nature of the sample, but that high fertility in communities of the same kind elsewhere could easily depend on different circum-

stances. Even so, some of the lines of thought opened up by Professor Stycos should be of value as a guide to similar inquiries in other countries.

P. R. C.

Further information about Puerto Rican fertility is given in an article by Stycos, Back and Hill in the April, 1956 number of the *Milbank Memorial Fund Quarterly*. This article, entitled "Contraception and Catholicism in Puerto Rico," shows from the results of sample inquiries that the opinions and wishes of Catholics in regard to family size are little different from those of other religious denominations. A high proportion of persons of all beliefs are in favour of birth control, but Catholics perhaps tend to defer its use longer than others.—EDITOR.

## GENETICS

**Goldschmidt, Richard B.** *Theoretical Genetics*. Berkeley and Los Angeles, 1955. University of California Press (London, Cambridge University Press). Pp x + 563. Price 64s.

DURING the last ten years, fundamental studies on the nature and action of the material basis of heredity have made rapid strides. Startling discoveries have resulted from the use, not only of our familiar friend *Drosophila*, but also of maize, yeasts, fungi, bacteria, bacteriophage, viruses, protozoa, amphibia and a host of other organisms. The techniques used are even more varied and the resulting publications numerous and often bewildering to the non-specialist. Professor Goldschmidt has now successfully completed, despite his seventy-eight years, the formidable task of collecting together this mass of unwieldy facts, analysing them and extracting from them a theory all his own. He deserves the admiration of us all.

Richard Goldschmidt's important contributions to genetics extend over forty-five years. During that time he has been responsible for a steady stream of original and arresting ideas. Somewhere in this latest of his many books he says "I have always been among the skeptics . . ."; few indeed of

the more widely held beliefs on the fundamental nature of genetic material and evolutionary processes meet with his approval. In *Theoretical Genetics* he tells us why.

This book, then, is a "personal report" rather than an impartial review. It is a result of the author's belief that the outline of a future theoretical genetics can now be sketched. The topics chosen and material discussed are, inevitably, a selection from those available; ones of less interest to the author or less relevance to the problem are omitted. Readers will, for instance, find only the barest reference to genetical work on Man, although many of the latest biochemical and serological discoveries might well be considered relevant.

The first section, of nearly 200 pages, reviews evidence on the nature and organization of the genetic material. The amount of detail can be judged from the fact that some thirty pages, or 10,000 words, are devoted to deoxyribose nucleic acid alone. Other topics include the role of heterochromatin, the action of mutagens, the "position effect," and the recent intriguing discoveries concerning crossing-over between alleles. Recent work on these phenomena, especially the last two, have clearly strengthened the author's belief that the classical theory of the gene is hopelessly out of date. He replaces the corpuscular genes, arranged like beads on a string, by overlapping functional fields, each controlling a "master reaction," but each only part of a larger field, concerned with more basic developmental processes. Thus the whole chromosome is visualized as a functional unit, composed of a hierarchy of fields. Many geneticists, while agreeing that classical theories need modification, may well find it difficult to accept the author's view that all mutations are just changes of pattern: submicroscopic rearrangements, deletions and the like.

After fifty pages on the genetical rôle of the cytoplasm, in which he attacks the theory of plasmagenes, Professor Goldschmidt discusses at length the action of the genetical material. He reiterates his opinion that the study of phenocopies